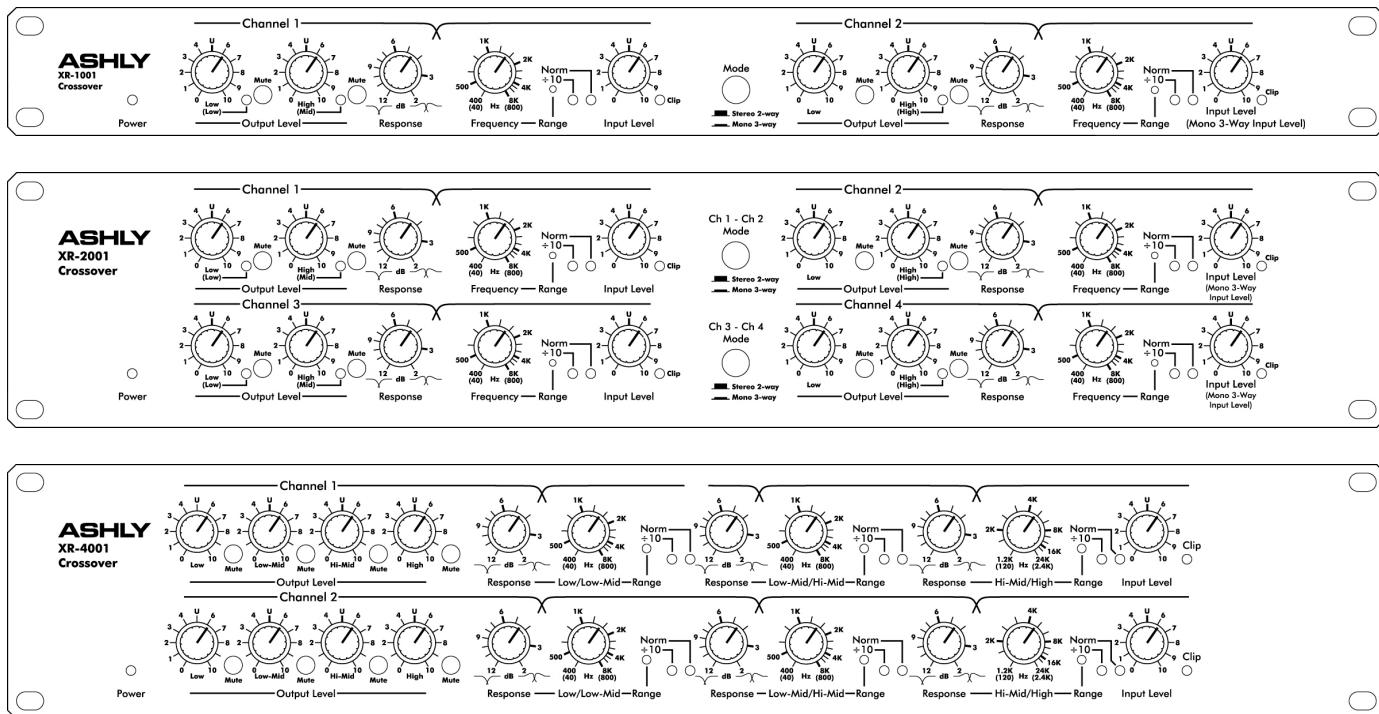


# ASHLY

XR-1001  
XR-2001  
XR-4001

## Electronic Crossovers

## Operating Manual



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## Important Safety Instructions

## Consignes de sécurité à lire attentivement



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons. The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the device.

Le symbole de la foudre dans un triangle équilatéral symbolisant la foudre est prévu pour sensibiliser l'utilisateur à la présence de tension de voltage non isolée à l'intérieur de l'appareil. Elle pourrait constituer un danger de risque de décharge électrique pour les utilisateurs. Le point d'exclamation dans le triangle équilatérale alerte l'utilisateur de la présence de consignes qu'il doit d'abord consulter avant d'utiliser l'appareil.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
6. Do not use this apparatus near water.
7. Clean only with dry cloth.
8. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
9. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
10. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
11. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
12. Only use attachments/accessories specified by the manufacturer.
13. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
14. Unplug this apparatus during lightning storms or when unused for long periods of time.
15. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

1. Lisez ces instructions.
2. Conservez ces instructions.
3. Observez les avertissements.
4. Suivez ces instructions.
5. Pour réduire le risque de feu ou la décharge électrique, ne pas exposer cet appareil pour pluvoir ou l'humidité.
6. Ne pas utiliser l'appareil près de l'eau.
7. Le nettoyer à l'aide d'un tissu sec.
8. Ne pas bloquer les ouvertures de ventilation, installer selon les consignes du fabricant.
9. Eloigner des sources de chaleur tel: radiateurs, fourneaux ou autres appareils qui produisent de la chaleur.
10. Ne pas modifier ou amputer le système de la mise à terre. Une prise avec mise à terre comprend deux lames dont une plus large ainsi qu'une mise à terre: ne pas la couper ou la modifier. Si la prise murale n'accepte pas la fiche, consulter un électricien pour qu'il remplace la prise désuète.
11. Protéger le cordon de secteur contre tous bris ou pincement qui pourraient l'endommager, soit à la fiche murale ou à l'appareil.
12. N'employer que les accessoires recommandés par le fabricant.
13. N'utiliser qu'avec les systèmes de fixation, chariots, trépied ou autres, approuvés par le fabricant ou vendus avec l'appareil.
14. Débrancher l'appareil lors des orages électriques ou si inutilisé pendant une longue période de temps.
15. Un entretien effectué par un centre de service accrédité est exigé si l'appareil a été endommagé de quelque façon: si il a été exposé à la pluie, l'humidité ou s'il ne fonctionne pas normalement ou qu'il a été échappé.

|                          |
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This manual uses a *Perpetual Table Of Contents*. Each page has a copy of the manual's contents in a gray box just like this one. The section you are in will always be bold with the other sections "grayed out." The feature allows you to jump directly to another section without having to return to a Table Of Contents page..

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## Introduction

Congratulations on your purchase of an Ashly XR Crossover. This crossover is the product of an intensive research effort which combined a reexamination of traditional crossover theory with practical field use. Over the years, refinements and new models have been added to our crossover series, but the original design goals have remained the same: to produce a crossover which is sonically accurate, is flexible enough to suit a wide variety of systems, and affords maximum protection for speakers and drivers. Due to the similarity of the operating controls on our various models, we have prepared this one manual to cover our complete crossover line

We are confident that you will be pleased with the high performance, superb sound quality, and reliability that Ashly is known for.

## About Ashly

Ashly Audio was founded in 1974 by a group of recording engineers, sound professionals, and electronics designers. The first products were custom consoles for friends and associates, but business quickly grew. The philosophy established from the very beginning holds true today: to offer only the highest quality audio tools at an affordable cost to the professional user – ensuring reliability and long life. More than thirty years later, Ashly remains committed to these principles.

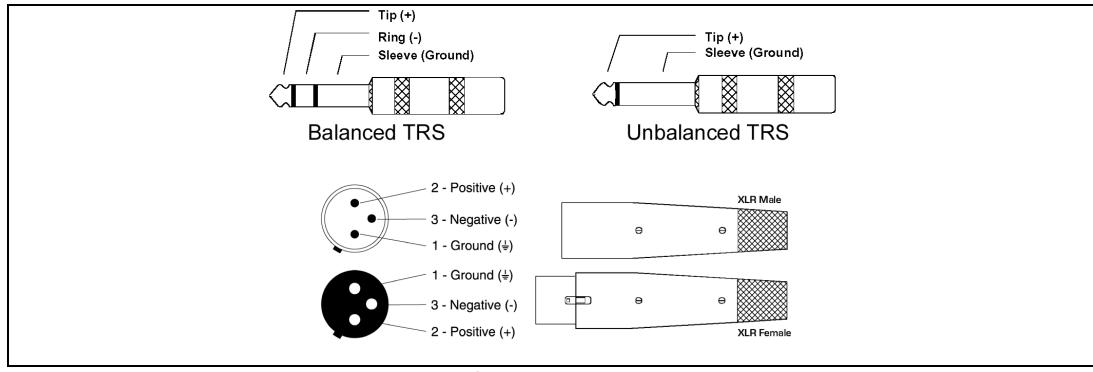
## XR Crossovers

Ashly crossovers are based upon a powerful state-variable filter circuit, which guarantees that two adjacent frequency band outputs always remain in phase. These crossovers offer a number of useful and unusual features, including continuous tuning, a response control, and a unique output stage, which maintains low noise at any level setting. The models also include a 200:1 tuning range, output mute switches, and both TRS and XLR connectors.

Like other Ashly products, your crossover features low noise and distortion, active balanced inputs, a peak level indicator, a precision regulated power supply, protection against abnormal input or output conditions, and rugged mechanical construction

## Connectors & Cables

The outputs are low impedance (100 ohms typical) servo-balanced using either connector. A servo-balanced output stage simulates a true transformer output to allow interfacing with virtually any type of load. For maximum headroom, terminate outputs into loads of 600 ohms or greater.



XR Connector Polarities

### Unbalanced Connections and Grounding

If you must use unbalanced connectors, the negative lead of the connector should be tied to the ground lead. Using unbalanced connections could result in chassis ground-loop noise. Altering the signal/chassis ground relationship in equipment connected to your MQX unit may eliminate the noise.

### Inputs

Inputs are  $20K\Omega$  active balanced, or  $10K\Omega$  unbalanced. The inputs of all Ashly crossovers are in phase with the outputs.

### Outputs

The outputs are low impedance ( $200\Omega$  typical) pseudo-balanced using either connector. Pseudo-balanced lines have an equivalent line impedance on both (+) and (-) lines, allowing for long cable runs without compromising common mode rejection of unwanted noise. For maximum headroom, terminate outputs into loads of  $600\Omega$  or greater.

Each model has an additional output labeled MONO LOW OUT. This output represents the sum of low frequency outputs of both channels, for driving mono sub-woofers in a stereo system, reducing the number of power amps needed.

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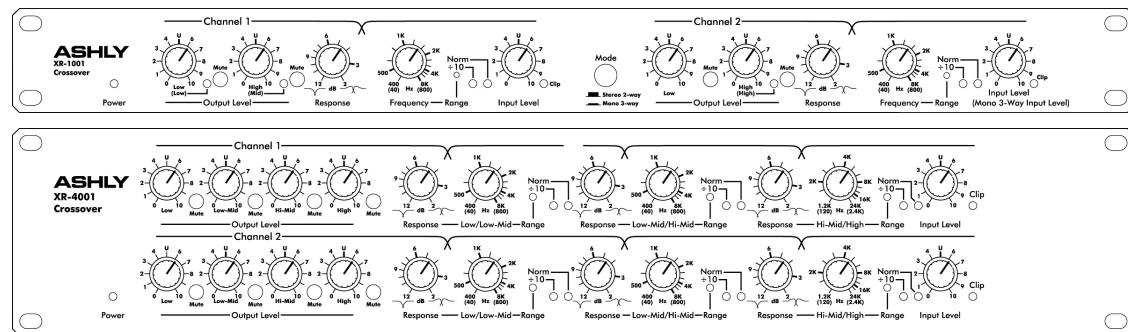
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## Physical Description

The XR-1001 is 1RU, and weighs 8 pounds. The XR-2001 & XR-4001 are 2RU, and weigh 11 pounds.

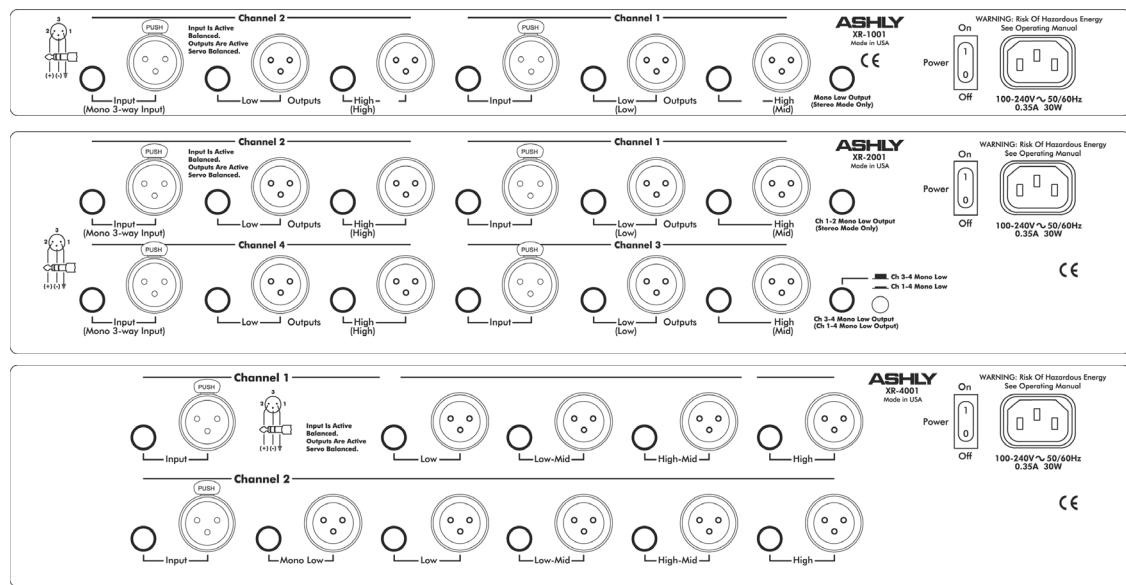
### XR-1001 & XR-4001 Front Panels



- Power** - There is a dedicated power LED on the front; the power switch is on the back of the unit.
- Input Level** - boosts incoming signal up to +8dB before it reaches the filters, or attenuates the signal to off. Maximum input level is +23dBu. The "U" shown at the 12:00 position indicates "unity gain."
- Crossover Frequency** - This infinitely variable control allows you to select an appropriate crossover point. Clockwise turning raises the crossover frequency while counterclockwise lowers it. Frequencies are marked on standard ISO 1/3 octave center frequencies with each octave calibrated. Calibration accuracy is typically within 1/3 octave or better. If greater accuracy is necessary, measure the actual crossover frequency with an external device.  
To allow a wider tuning range, the crossovers use a recessed range switch for each frequency control. LED indicators provide range status at power-on. The range switch divides the frequency indicated on the frequency control by 10 and gives a total range of 200:1. Avoid damage to speakers by muting the outputs before changing the range switch.
- Response** - adjusts the damping of the filter affecting the response shape at the crossover point. The dial calibrations refer to the amount of attenuation effected by the filter at the crossover frequency, i.e., a setting of 3dB means that the filter's high-pass and low-pass outputs are each "rolled off 3dB at the crossover point". This describes Butterworth filter response, or a gentle 3dB peak at the crossover point where the two filter output signals overlap. To obtain a flat signal, or "Linkwitz-Riley" response, set the Response control to "6". To obtain a notch at the crossover point, turn down the response control past "6" to best suit your needs. The purpose of this control is to help offset the inaccuracies inherent in typical loudspeakers, helping you to achieve a flat system response. *NOTE: The Response control is not a "slope" control. The Response control only affects filter response shape in the immediate vicinity of the crossover frequency; the ultimate crossover slope is a fixed parameter.*
- Output Level** - The output stage operates at unity gain with the output level controls set at "U". Max gain of the output stage is +15dB. In a typical setup, power amplifier input level controls should be run "full-on", with level control being accomplished at the crossover. Note that horn and compression driver combinations are much more efficient than cone speakers, often by 12 to 20dB. When used together, you should expect a much lower level setting for the horns to obtain proper balance. Output mute switches allow you to isolate individual or grouped outputs for listening tests without affecting the settings of any other outputs.
- Clip Indicator** - Ashly crossovers feature a peak detection which monitors signal level at several critical points. The LED will flash when signal levels of +20dBu are reached anywhere in the crossover. Since our crossovers have a nominal 23dB of headroom referenced to a standard operating level of 0dBu (.77 Volts), a flashing LED warns you that you are only 3dB from clipping. Since peak levels are monitored at several points, the clip LED can be used to isolate the source. If the LED flashes even though all input and output levels are turned down, the signal feed is excessive. If the LED flashes when you turn the Input level control up (with the outputs still turned down), the overload is occurring in the filter sections, and you should back the Input level down a bit. If the LED first flashes when you turn the output level controls up, then the overload is occurring in the output stage. In this case, if your power amplifier controls are at full gain, you are probably severely overdriving your amplifier.

**CAUTION:** High frequency compression drivers may be destroyed by the use of too low a crossover frequency. Make sure the range switch is properly set. You may want to install a security cover if the unit is accessible to untrained people.

## XR-1001, XR-2001 and XR-4001 Rear Panels



- Inputs** - For unbalanced inputs, the signal should be on the + connection and the - connection tied to ground. A mono 1/4" plug used as an unbalanced connection will automatically be grounded. When using a stereo plug, or XLR connector for an unbalanced signal, the (-) input connection MUST be tied to ground.
- Balanced Outputs** - This output circuit is an active output which maintains a constant output level between the (+) and (-) output terminals, regardless of either terminal being connected to ground. This servo-balanced output provides an unchanged signal without regard to ground.
- Power** - Switches the unit power on or off.

## Installation

Before connecting to mains power, make sure that the switches are set to the configuration needed for your particular application. Always switch the crossover off before making substantial changes to the settings, especially the Range. Failure to do so could result in damage to the unit or other components in your system. Use four screws and washers when rack mounting. For mobile use, the unit should be further secured as appropriate.

## General Requirements

XR Crossovers have specific physical, electrical and signal requirements for proper operation. These requirements will vary depending on your specific application, setup, and the settings on the unit. When setting up and testing your system, please take special care to double check all connections and settings. Please refer to the specifications section of this manual for specific input, output and other figures.

## AC Power

XR crossovers should be connected to a standard 3-wire grounded electrical outlet supplying 90-240 Volts, 50-60 Hz. To reduce the risk of ground loop hum, connect all audio equipment to the same electrical power source. Removal of the ground pin is both unlawful and dangerous, as a potential shock hazard could result.

This unit will perform normally within the AC voltage range specified above. Voltages less than this, as found in "brown-out" conditions, may reduce performance. In the event of a blown fuse, replace only with same type fuse. No user serviceable parts are inside the chassis. Overall power consumption is less than 15 watts.

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## Typical Applications

The following information will help you make the most of your new crossover:

### Connecting to a Sound System

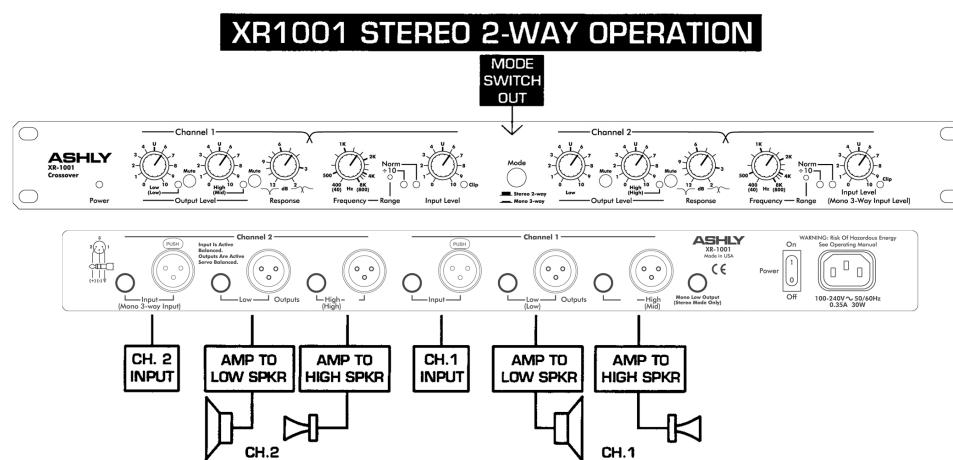
Usually, the output signal from a final processing source such as a limiter or equalizer is fed to a crossover input and each crossover output feeds a power amplifier channel.

Sometimes limiters are used on each crossover output to provide more accurate protection.

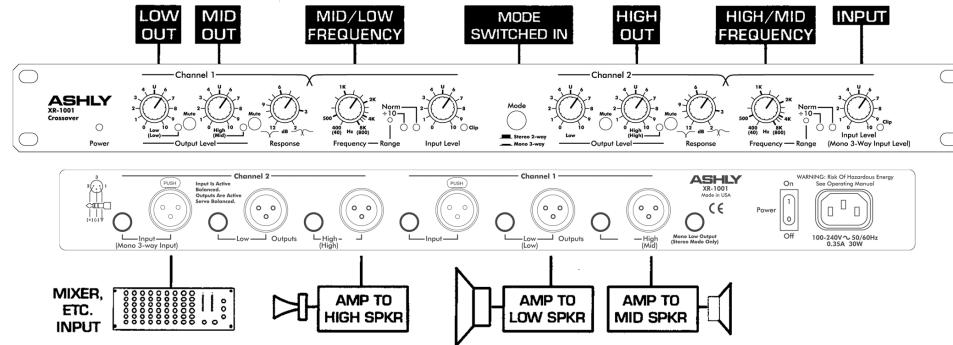
### Speaker Placement

To obtain maximum benefit from your crossover, a correctly assembled speaker array is a necessity. Low frequency speakers should be grouped as closely together as possible and mid and high frequency drivers should be stacked vertically. This arrangement produces a tight vertical pattern, with wide horizontal dispersion free from high frequency lobing. If possible, speakers in the array should be arranged so the drivers are equal distance from the listener.

### XR 1001 Stereo 2-Way or Mono 3-Way Operation



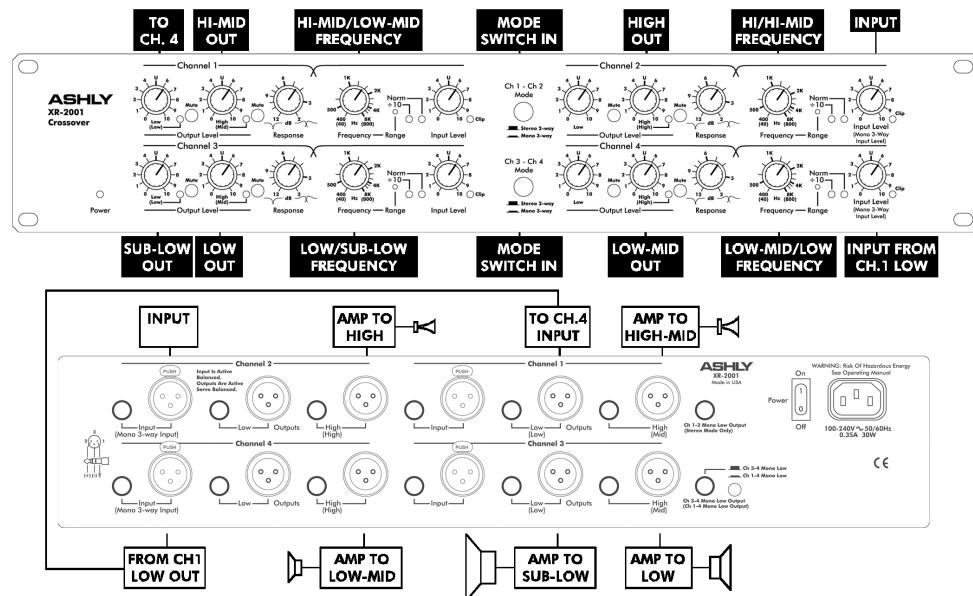
### XR1001 MONO 3-WAY OPERATION



### XR1001

This product functions as either a stereo 2-way or mono 3-way crossover. Mono 3-way is selected by depressing the MODE switch and using the appropriate connectors and controls.

## XR 2001 Mono 4-Way or Mono 5-Way Operation



### XR2001

The XR 2001 functions as a four channel 2-way, stereo 3-way, mono 4-way, or mono 5-way. For mono 4-way or mono 5-way operation, cascade a low output (set up as a mid in a 4-way or 5-way) to the next channel's input, setting the matched output and input level controls to unity gain.

### XR4001

The XR4001 is a stereo 4-way crossover. If desirable, you can cascade the low output of one channel into the input of the other, similar to XR2001 in mono 5-way mode. This configuration results in a mono 5-way with tunable lowpass and highpass filters to protect against unwanted subsonic/ultrasonic signals. When using the mono low output, remember that both channels contribute to the signal, and should be set equally.

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## Troubleshooting

| Situation                     | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No Output                     | Check AC power - is LED indicator on? Check in/out connections, are they reversed? Are you sure you have input signal?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Peak light flashes frequently | The level is too high somewhere in the crossover. Try turning down individual output levels and then the input until the peak LED stays off. If the peak LED continues to flash when all of the crossover level controls are turned down, then the crossover is being fed excessively high levels from a previous piece of equipment. Turn down your driving source.                                                                                                                                                                                                                                                                           |
| Distorted sound               | Is the peak light flashing? If it is, an overload is occurring within the crossover, and may also be occurring in other parts of the system. If the peak light is not flashing, the distortion is occurring somewhere outside the crossover.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Excessive hum or noise        | Hum will usually be caused by a "ground loop" between components. Try using the suggested balanced input and output hookups if the other pieces of equipment used in conjunction with your crossover have balanced inputs and outputs. Noise can be caused by insufficient drive signal. Ashly crossovers provide the best noise and headroom performance when the input signal is 0 to +4dBu level and power amplifier sensitivity is higher than 1 volt. Unshielded cables, improperly wired connections, and cable with broken strands (shorts, etc.) are the most common problems. Please properly maintain and inspect your wiring first. |

*Note: Unshielded cables, improperly wired connections, and cable with broken strands (shorts, etc.) are the most common problems. Make sure you use good quality cable with connectors soldered firmly on the correct pin. When in doubt, get in touch with your Ashly dealer.*

## Dimensions

## Specifications

| Specification        | XR 1001                          | XR 2001                          | XR 4001                          |
|----------------------|----------------------------------|----------------------------------|----------------------------------|
| Input Level Control  | -∞ to +8.5 dB                    | -∞ to +8.5 dB                    | -∞ to +8.5 dB                    |
| Damping/Response     | 2dB – 12dB                       | 2dB – 12dB                       | 2dB – 12dB                       |
| Output Level Control | -∞ to +15 dB                     | -∞ to +15 dB                     | -∞ to +15 dB                     |
| Input Impedance      | 20KΩ Balanced                    | 20KΩ Balanced                    | 20KΩ Balanced                    |
| Output Impedance     | 100Ω Servo Balanced              | 100Ω Servo Balanced              | 100Ω Servo Balanced              |
| Maximum Input Level  | +23 dBu                          | +23 dBu                          | +23 dBu                          |
| Maximum Output Level | +23 dBu                          | +23 dBu                          | +23 dBu                          |
| Frequency Response   | ±0.5dB 20Hz-20kHz                | ±0.5dB 20Hz-20kHz                | ±0.5dB 20Hz-20kHz                |
| Distortion           | <0.05% THD (+10 dBu 20 Hz-20kHz) | <0.05% THD (+10 dBu 20 Hz-20kHz) | <0.05% THD (+10 dBu 20 Hz-20kHz) |
| Slew Rate            | 6V/μS                            | 6V/μS                            | 6V/μS                            |
| Hum and Noise        | <-95dBu unweighted 20 Hz-20kHz   | <-95dBu unweighted 20 Hz-20kHz   | <-95dBu unweighted 20 Hz-20kHz   |
| Power Requirements   | 100-240 VAC 50-60 Hz<br>24 Watts | 100-240 VAC 50-60 Hz<br>24 Watts | 100-240 VAC 50-60 Hz<br>24 Watts |
| Shipping Weight      | 13 lbs                           | 16 lbs                           | 16 lbs                           |
| Dimensions           | 19" L x 1.75" H x 8" D           | 19" L x 3.5" H x 8" D            | 19" L x 3.5" H x 8" D            |

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## Limited Warranty

Warranty service for this unit will be provided by ASHLY AUDIO INC. in accordance with the following warrant statement.

ASHLY AUDIO INC. warrants to the owner of this product that this product and the components thereof, will be free from defects in workmanship and materials for a period of FIVE years from the date of purchase. ASHLY AUDIO INC. (ASHLY AUDIO) will, without charge, repair or replace, at its option, defective product or component parts upon prepaid delivery to the factory service department or authorized service center, accompanied by proof of purchase date in the form of a valid sales receipt. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

**EXCLUSIONS:** This warranty does not apply in the event of misuse, neglect or as a result of unauthorized alterations or repairs. This warranty is void if the serial number is altered, defaced, or removed. ASHLY AUDIO reserves the right to make changes in design or make additions to or improvements upon this product without any obligation to install the same on products previously manufactured.

Any implied warranties which may arise under the operation of State law shall be effective only for FIVE years from the date of purchase of the product. Ashly Audio shall be liable only to correct defects in the product itself, and not for any damage or injury which may result from or be incidental to or a consequence of such defect. Some states do not allow either limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

### Obtaining Warranty Service in the United States

For warranty service in the United States, please follow this procedure:

Return the product to Ashly, freight prepaid, with a written statement describing the defect and application the product is used in. Ashly Audio will examine the product and perform any necessary service, including replacement of defective parts, at no further cost to you.

Ship your product to:

Ashly Audio Inc.  
Attn: Service Department  
847 Holt Road  
Webster, NY 14580-9103

For units purchased outside The United States of America, service will be provided by an authorized distributor of ASHLY AUDIO INC.

**Obtaining Warranty Service Outside the United States** For units purchased outside The United States of America, service will be provided by an authorized distributor of ASHLY AUDIO INC.

